

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in this application:

Listing of Claims:

1. (Currently Amended)

MODULAR INFRARED IRRADIATION APPARATUS AND ITS CORRESPONDING MONITORING DEVICES, the modular IR irradiation apparatus (1), more particularly directed to heat ~~transfer~~ transfer at elevated rates to a receiving substrate (L), as in industrial drying steps of paper and cellulose production; the modular IR irradiation apparatus (1) comprises a metallic frame or bed (2), which is designed to receive a number of irradiation modules (7), ~~containing~~ containing primary plenum (3p) and secondary plenum (3s) distribution ducts which contain feeding outlet (3a) for the mixture of combustible gas and air (G) to the modules (7); characterized in that the modular IR irradiation apparatus (1) comprises:

- Mounting means which is explosion proof and blocks the bed (2) by means of side lower (LI) and upper (LS) metallic plates arranged in a laminar portion having angular flaps (18) fixed in side closing mirrors (19) and ~~having further closing of~~ bottom caps (6) having side flaps (6a) and closing flaps (22 and P1) ~~and being engaged in an longitudinal latch~~ a longitudinal latch (22) in the flap (18) of the lower plate (LI); ~~the blind mirror (EC) and the instrument mirror (EI) having holes which are fitted to the devices to be fixed thereto;~~

- Constructing means for fixing the irradiation element (1) to the ~~process~~ apparatus via support tube (4) and locking bearing (M);

- Constructing means for ~~housing, feeding, and~~ combustible gas (G) distribution in the a flexible ~~refractory~~ refractory ceramic plate (15) ~~of~~ modules (7) mounted transversally to the cavity (CR) of the bed (2);

- Mechanical means ~~of~~ for pressurized sealing air admission duct (AS) in the mirror (EI) of the bed (2), for pressurization of the inner cavity of the equipment, for cooling the UV system and ~~provide for providing a venturi effect of the~~ for an oxygen measuring means;

- Constructing means for ~~side mounting~~ mounting and sealing (17) of the ~~flexiveis refratorie~~ flexible refractory ceramic plate (15) of the modules (7) and fixation of the ~~for fixing~~ ceramic thin housings (16) with an elastomer (17);

- The flexible refractory ceramic plate (15) is ~~maleable~~ malleable and have has a porous feature related to the a fibrous mass;

- Monitoring device of the ~~for monitoring a~~ thermal flow direction of the modules (7) by using sensors (14);

- Collecting and monitoring device of the ~~smokes~~ smoke from the surface burning (D1) of the modules (7) by using oxygen measuring means (23) based on ~~Zireoninum~~ zirconium oxide;

- UV flame detection device (24) applied in ~~th~~ the tube (4) positioned to the cavity (CR) and the surface (D1).

2. (Currently Amended)

Apparatus, according to claim 1, characterized in that the metallic sides plates (LS) are provided with alleviating and dilatation channels (AD).

3. (Currently Amended)

Apparatus, according to ~~any one of claims 1 or 2~~ claim 1, characterized in that each irradiation module (7) comprises a base receiver (8) having a feeding hole (11), each module (7) is fixed to the plena (3p, 3s) by means of screws and pins (P); the referred base (8) receives at its free edge a screen (12) having holes (12a) and in which a lower face are fixed ~~at least two set of~~ thermal flow sensors (14) interconnected by the electronic circuit (13), wherein the sensors (14) include at least two sets of sensors (14).; such sensors (14) are interconnected to an electronic device (14a) which is connected to the LPC central; at the upper face of the referred screen (12) is positioned a porous flexible refractory ceramic plate (15) and its respective fixing means, side sealing (17) (S) in which lower median portion the sensors (14) are kept.

4. (Currently Amended)

Apparatus, according to claim 1, characterized in that the bed (2) internally receives rectangular support and distribution ducts, a primary plenum (~~3p~~) (3p), a secondary plenum (3s)

which possesses a feeding tube ~~(40)~~ (10), and outlets (3a) for feeding the modules (7) with combustible gas/air mixture ~~(G)~~ (G), such ducts are aligned to holes (9) existing in each one of modules (7) directed to the secondary plenum (3s) or via modulation or blocking valve (VL) to the primary plenum (3p).

5. (Currently Amended)

Apparatus, according to claim 4, characterized in that the feeding hole (9) of each module (7) is positioned in relation to the surface ~~called~~ of a base receiver (8).

6. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the modules (7) can be coupled via feeding hole (9) to the primary plenum (3p) or to the secondary plenum (3s) by a 180 rotation position inversion of each module (7).

7. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the modules can be framed in variable ~~lengths~~ lengths and widths.

8. (Currently Amended)

Apparatus, according to claim 3, characterized in that holes (12a) of ~~th~~ the screen (12) ~~have are~~ are circular dimensions or other suited dimensions.

9. (Currently Amended)

Apparatus, according to ~~claim 3~~ claim 3, characterized in that thermal flow sensors (14) ~~overpass~~ pass the screen (12) ~~until effect a deep contact~~ to contact the ceramic (15) where the sensors are fixed in one position under the line (Y).

10. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the side stopping means (S) of each plate of flexible refractory ceramic are arranged ~~for to~~ to fit in thin

ceramic housings (16) anchored at the side faces of the ceramic plate by an elastomer layer (17) which is able to penetrate in both parts (15,16).

11. (Currently Amended)

Apparatus, according to ~~claim 10~~ claim 10, characterized in that the sealing means (S) serves as anchoring means adhering to the parts (15,16) and avoiding side dispersion (D) of the combustible gas/air mixture (G) entering in the ceramic plate (15) via screen holes (12a).

12. (Currently Amended)

Apparatus, according to ~~claims 10 and 11~~ claim 10, characterized in that the sealing means (S) of each one of ceramic plate (15) avoid a side burning zone (D) keeping the burning zone restricted to the face (D1) existing at the surface of the ceramic plate (15).

13. (Currently Amended)

Apparatus, according ~~de to~~ to claim 11, characterized in that a block comprising the flexible refractory plate (15) and the thin ceramic housings (16) ~~are is~~ fixed to the screen and to the base (8) by applying an elastomer layer (17) producing a flexible sealed junction which supports natural vibrations.

14. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the ~~elastomer~~ elastomer (17) is high temperatures resistant.

15. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the refractory ceramic plate is flexible and porous.

16. (Currently Amended)

Apparatus, according to claim 15, characterized in that the fiber fabric (F) of the ceramic plate (15) is kept free for movements (V) which can occur due to the forced passage of gas (G),

permitting the movement for distribution of gas flow through the pores (R) of the fibrous ~~estature~~ structure.

17. (Currently Amended)

Apparatus, according to ~~claims 15 or 16~~ claim 15, characterized in that the porous flexible refractory ceramic plate (15) permits modulation of the gas volume (G) and the emission power of the irradiation apparatus (1) keeping the rate of discharge in the active pores compatible with the combustion rate and keeping the emission temperature and the flame position stable at the first layers (D1) of the ceramic plate (15).

18. (Currently Amended)

Apparatus, according to ~~any one of preceding claims~~ claim 1, characterized in that the thermal flow sensor (14) is able to ~~monitoring~~ monitor the thermal flow inversion at the ceramic plate (15), and ~~keeping~~ keep a maximum temperature differential at ~~de a~~ a median line (Y) in each ceramic plate.

19. (Currently Amended)

Apparatus, according to claim 18, characterized in that the sensors (14) are verified by the LPC which is the responsible for the temperature differential monitoring in each plate (15) and generates a gas ~~bleeking~~ blocking alarms.

20. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the oxygen measuring means (23) comprises a ~~Zireoninum~~ zirconium oxide based sensor (25) which is applied near to the burning zone (D1) and is able to ~~monitoring and analyzing~~ monitor and analyze the amount of residual oxygen after the combustible burning; the sensor is connected to the LPC of the monitoring system.

21. (Currently Amended)

Apparatus, according to claim 20, characterized in that the oxygen measuring means (23) comprises a device having a temperature controlled chamber (26) formed by five tubular bodies

(27,28, 30,31, 33) which are welded (29) one to the other, the set oxygen measuring means (23) is fixed by holders (34) at the side upper internal flap (LI), the tubular body (28) is fixed in one extension (31) which is able to form a venturi system joined joining the tubular body (30), the tube (30) have has the greatest diameter for conduct the conducting pressurized sealing air from the bed (2) to outside, a collecting tip (35) is coupled to the upper edge of the tube (33) and it is provided with holes (36) at the lower position and with concentrating flaps (37).

22. (Currently Amended)

Apparatus, according to ~~claims 20 and 21~~ claim 20, characterized in that the collecting tip (35) is used by the differential lighting system as ground contact for discharge the trigger.

23. (Currently Amended)

Apparatus, according to ~~any one of the preceding claims~~ claim 1, characterized in that the UV flame detector (24) comprises ~~an~~ a UV bulb sensor (39) encapsulated and protected (38) inside the cooling device (40) which extends to the collimation cavity of IR emission (CR) via ceramic tube (47); the UV sensors (24) are positioned at the external side of the instrument mirror (EI), more particularly fixed at the supports (44) by means of tubes (48) which serve to conduct pressurized sealing air inside the irradiation support tube (4) to the cooling body (40); the cooling body (40) comprises flaps (41) at its external face defining cooling channels for keeping the inner chamber (42) of the sensor housing (39) cool; such body also comprises ~~an~~ a lower hole (43) coupled to the metallic box type support (44) through which the cooling air is conducted and the wires connecting the electronic monitoring part (flame relay); the ceramic protection tube (47), is fixed to the cooling body (40) to the flange (45) which possesses inner tips as retention means (46) of such tube (47).

24. (Original)

Apparatus, according to claim 23, characterized in that the UV flame detector (24) can be double mounted and being placed two flame detectors (24) to a single irradiation apparatus (1).

25. (Currently Amended)

Apparatus, according to ~~claims 23 and 24~~ claim 23, characterized in that the ceramic tube (47) restrains and ~~protect~~ protects the sight field of the bulb (39) against obstructions caused by vapor clouds from the process.